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(54) DEVICE FOR COOLING YARN OF MELT SPINNING OF POLYESTER FIBER

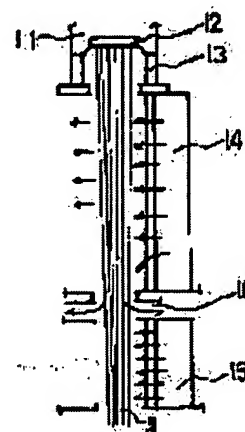
(57)Abstract:

PURPOSE: To obtain a device for cooling yarn of melt spinning for simply and inexpensively producing undrawn polyester yarn having a low double refractive index and small variability of denier by efficiently and uniformly cooling polyester yarn having ≥ 10 deniers of single yarn denier after spinning and taking up.

CONSTITUTION: Molten polyester is extruded from a spinneret 12 and spun as yarn (y) from a heating column 13 heated to a high temperature of \geq the melting point.

The formed yarn (y) is chilled by cold wind blown out from a horizontally blowing first cooling air outlet 14, then air in the column is discharged from an exhaust suction part 16 and the temperature in the column is dropped.

Since the yarn is chilled by a second cooling air blowing part 15, cooling at the lower part of the spinning column to form double refractive index is increased and solidification is promoted to give undrawn yarn having a low double refractive index.



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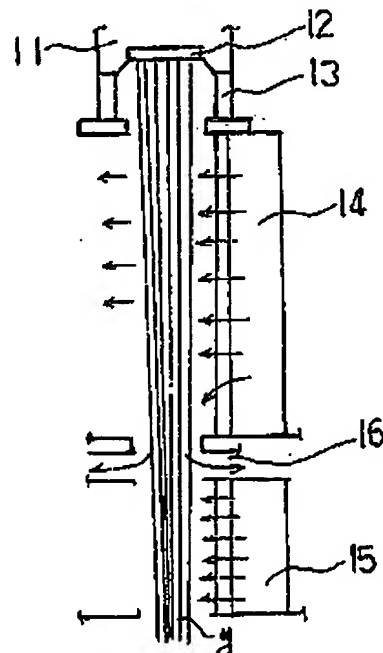
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(54)【発明の名称】 ポリエステル繊維の溶融紡糸冷却装置

(57)【要約】

【目的】 紡出された引取り後の単糸デニールが10デニール以上のポリエステル糸条を効率良く均一に冷却し、低複屈折率でかつデニール斑の小さな未延伸糸を簡便でかつ安価に製造するための溶融紡糸冷却装置を提供する。

【構成】 溶融されたポリエステルは紡糸口金12より吐出され、融点以上の高温に加熱された加熱筒13を経て糸条Yとして紡糸される。形成された糸条Yは横吹き第1冷却風吹出部14から吹き出す冷却風で冷却され、次いで排風吸引部16により筒内の空気が排出され、筒内の温度は下がり、更に第2冷却風吹出部15により冷却されるため、複屈折率が生成する紡糸筒下部の冷却が増大して固化が促進され、低複屈折率の未延伸糸が得られる。



【特許請求の範囲】

【請求項1】 エチレンテレフタレートを主たる繰返し単位とするポリエステルを溶融紡糸冷却して引取後の単糸デニールが10デニール以上の未延伸糸を得る溶融紡糸冷却装置において、紡出糸条に対して冷却風が横切るように吹出す第1冷却風吹出部及びその直下に排風吸引部を設け、更に該排風吸引部の直下に第2冷却風吹出部を設けたことを特徴とするポリエステル繊維の溶融紡糸冷却装置。

【請求項2】 排風吸引部が紡出糸条の細化完了点±20mmである請求項1記載のポリエステル繊維の溶融紡糸冷却装置。

【発明の詳細な説明】

【0001】

【産業上の利用分野】本発明はポリエステル繊維の溶融紡糸冷却装置に関するものであり、更に詳しくは溶融紡糸された引取り後の単糸デニールが10デニール以上のポリエステル繊維を冷却風を用いて冷却固化する溶融紡糸冷却装置に関するものである。

【0002】

【従来の技術】ポリエステル繊維はその力学的、熱的性質が優れていることから衣料分野のみならず、産業資材用繊維として広く使用されている。

【0003】特に、産業資材用繊維としてはより高強度化が要求され、その要求性能を十分に満足するために種々の製造方法が提案されている。

【0004】一般的には、高倍率延伸可能な高重合度ポリエステル未延伸糸の溶融紡糸法として、紡糸口金直下に加熱筒及びこの加熱筒の下部に冷却風吹出部を有する冷却筒を取付け、紡出糸をその融点以上の温度に保持した加熱筒内を通過させた後、冷却することにより紡出糸の複屈折率を低下させる方法が知られている（例えば特公昭39-7251号公報、特公昭41-7892号公報）。

【0005】しかしながら、これらの方法では得られる紡出糸が単糸デニールが10デニール以上のポリエステルの場合は冷却が十分かつ均一に行われないため、デニール斑が大きく延伸性が良好でないという問題が生じ、一方冷却を十分かつ均一に行うため吹出長を長くしたり、冷却風の風量を多くするという方法が検討されているが、設備が大型となり、またコストも高くなり工業的に不利となつている。

【0006】ポリエステル糸条を製造する一般的な溶融紡糸装置として、例えば図2に示すような装置がある。すなわち、溶融されたポリマーは口金パック1内の口金2を通過して紡出され糸条yとなる。糸条yは送張部4から吹出される冷却気体によって冷却固化される。

【0007】このような従来から一般的に用いられている溶融紡糸装置で単糸デニールが10デニール以上の未延伸糸を複屈折率を低くするため加熱ゾーン3を設けて

製造しようとする、デニール斑が大きく、本来目的の高強力糸が得られない。

【0008】この最大の理由は以下の通りである。

【0009】すなわち、通常の溶融紡糸装置を用いて単糸デニールが10デニール以上の低複屈折率の未延伸糸を得るため、紡出した糸条を融点以上の加熱筒に通しているが、糸温度が高く、通常の冷却風量では十分かつ均一に冷却することができない。

【0010】また、低複屈折率を得るため一般的に低速であるため、随伴流が起き難く糸温度は更に下がり難い。

【0011】この問題を解決するため冷却風量を多くする方法は張力が上り、複屈折率が高くなつてしまふばかりでなく、糸揺れが激しくデニール斑を増大させる結果となる。また、紡糸筒長を長くする方法は設備が超大なものになるため設備コストが上り、工業的に採用することは不利である。

【0012】

【発明が解決しようとする課題】本発明はこのような従来技術の問題点を解消し、紡出された引取り後の単糸デニールが10デニール以上のポリエステル糸条を効率よく均一に冷却し、低複屈折率でかつデニール斑の小さな未延伸糸を簡便でかつ安価に製造するための溶融紡糸冷却装置を提供することを目的とするものである。

【0013】

【課題を解決するための手段】すなわち、本発明はエチレンテレフタレートを主たる繰返し単位とするポリエステルを溶融紡糸冷却して引取後の単糸デニールが10デニール以上の未延伸糸を得る溶融紡糸冷却装置において、紡出糸条に対して冷却風が横切るように吹出す第1冷却風吹出部及びその直下に排風吸引部を設け、更に該排風吸引部の直下に第2冷却風吹出部を設けたことを特徴とするポリエステル繊維の溶融紡糸冷却装置である。

【0014】以下、本発明を図面に基つて具体的に説明する。図1は本発明の実施例を示す縦断面の模式図である。

【0015】図において、11は紡糸口金12を装着した紡糸口金パックであり、その直下位置には紡出糸yの融点以上に加熱された加熱筒13が設けられ、更にその下方に冷却風を横方向に吹き出す横吹き第1冷却風吹出部14が配設されている。

【0016】また、第1冷却風吹出部14の下方に第2冷却風吹出部15が配設され、この第2冷却風吹出部15と第1冷却風吹出部14の間には排風吸引部16が設けられている。

【0017】このように構成された装置において、溶融されたポリエステルは紡糸口金12より吐出され、融点以上の高温に加熱された加熱筒13を経て糸条yとして紡糸される。

【0018】形成された糸条yは横吹きの第1冷却風吹

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出部14により冷却風によって冷却される。次いで排風吸引部16により筒内の空気は排出され、筒内の温度は下がり、更に第2冷却風吹出部15により冷却されるため、複屈折率が生成する紡糸筒下部の冷却が増大されて固化が促進され、低複屈折率の未延伸糸が得られる。

【0019】ここで、排風吸引部16は冷却風吹出部の前後から排気するように設けるのが好ましく、両側から吸引量を調整し吸引することによって、糸条が一方に片寄ることが防止でき、デニール斑を一層抑制することが可能になる。

【0020】また、排風量は横吹き冷却風の風量、紡糸速度、未延伸糸のデニールから、本発明の効果を満足する範囲で適切に選定されれば特に限定されるものではない。

【0021】更に、排風吸引口の大きさは極度に小さくして吸引速度を上げた結果、局所的な糸揺れ増大を起こさせないような範囲で適切に選定すればよい。

【0022】また、排風吸引部の位置は細化完了点±20cmの範囲にするのが好ましく、この位置が細化完了点から上部20cmを越えると糸揺れが激しくデニール斑を増大させ易くなる傾向がある。逆に細化完了点から下部20cmを越えると、細化完了点での糸温度が高いため均一な冷却が困難となり低複屈折率を得ることが難しくなる傾向が生じてくる。

【0023】

【実施例】以下、実施例により更に具体的に説明する。

【0024】固有粘度0.9のポリエステル重合体を約300℃で熔融し、孔径0.3mm、孔数48個を有する紡糸口金より吐出後、400℃のいわゆる加熱筒に通し、更に25℃の冷却風を吹き付けながら冷却固化さ

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*せ、その後オイリングローで油剤を付与して単糸デニール15デニールとして800m/分で巻き取った。

【0025】このとき、第1冷却風吹出部より4Nm'/分の冷却風を吹き付け、次いで排気部より3Nm'/分吸引し、かつ第1冷却風吹出部より3Nm'/分吹き付けたところ、イブネスu%が0.5%のデニール斑の少ない、複屈折率が0.003の低複屈折率を有する未延伸糸が得られた。

【0026】この場合、従来方式の紡糸筒で冷却したところ、糸温度が下がらないためイブネスu%が1.0%のデニール斑、複屈折率が0.007であつて、その斑が増大しており、得られた未延伸糸の延伸性は著しく低下した。

【0027】

【発明の効果】以上に説明の如く、本発明によれば従来の熔融紡糸装置では困難であつた、単糸デニールが10デニール以上の、低複屈折率でデニール斑の少ないポリエステル未延伸糸を容易にかつ安定して得ることができ、その結果品質の優れた高強力糸を安定して生産することが可能になるという顕著な効果を奏する。

【図面の簡単な説明】

【図1】本発明の実施例を示す縦断面の模式図である。

【図2】従来の装置の縦断面を示す模式図である。

【符号の説明】

11 紡糸口金パック

12 紡糸口金

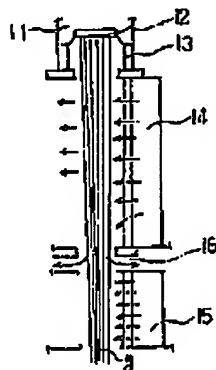
13 加熱筒

14 第1冷却風吹出部

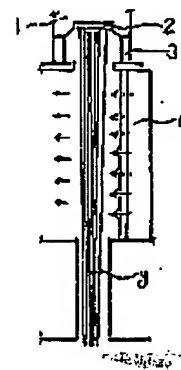
15 第2冷却風吹出部

16 排風吸引部

【図1】



【図2】



【手続補正書】

【提出日】平成4年11月2日

【手続補正1】

【補正対象書類名】明細書

【補正対象項目名】請求項2

【補正方法】変更

【補正内容】

【請求項2】 排風吸引部が紡出糸条の細化完了点±20cmである請求項1記載のポリエステル繊維の溶融紡糸冷却装置。

【手続補正2】

【補正対象書類名】明細書

【補正対象項目名】0022

【補正方法】変更

【補正内容】

【0022】また、排風吸引部の位置は細化完了点±20cmの範囲にするのが好ましく、この位置が細化完了点から上部20cmを越えると糸揺れが激しくデニール率を増大させ易くなる傾向がある。逆に細化完了点から下部20cmを越えると、細化完了点での糸温度が高いため均一な冷却が困難となり低復屈折率を得ることが難しくなる傾向が生じてくる。

Machine Translation of JP 05-195309

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1. This document has been translated by computer. So the translation may not reflect the original precisely.
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CLAIMS

[Claim(s)]

[Claim 1] The melt spinning cooling system of the polyester fiber characterized by to have prepared the exhaust air suction section in the blow-off section of the 1st cooling style and directly under [of it], and to prepare the blow-off section of the 2nd cooling style directly under this exhaust air suction section further. [which blow off in the melt spinning cooling system with which melt spinning cooling of the polyester which makes ethylene terephthalate a main repeating unit is carried out, and the single-yarn denier after taking over obtains non-extended yarn 10 deniers or more so that a cooling wind may cross to a spinning line of thread]

[Claim 2] The melt spinning cooling system of the polyester fiber according to claim 1 whose exhaust air suction section is **20mm of points of a spinning line of thread completing [**-ized].

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention relates to the melt spinning cooling system by which melt spinning was carried out and with which it takes over and a next single-yarn denier carries out cooling solidification of the polyester fiber 10 deniers or more using a cooling wind in more detail about the melt spinning cooling system of polyester fiber.

[0002]

[Description of the Prior Art] Since [the] dynamic and a thermal property are excellent, polyester fiber is widely used not only as the garments field but as fiber for industrial materials.

[0003] Especially as fiber for industrial materials, high powerful-ization is required more, and in order to fully satisfy the military requirement, the various manufacture approaches are proposed.

[0004] Generally the cooling dome which has the blow-off section of the cooling style in a heating cylinder and the lower part of this heating cylinder is attached directly under a spinneret as a melt spinning method of the high-polymer polyester the non-extended yarn in which high scale-factor extension is possible, and after passing the inside of the heating cylinder which held spinning yarn to the temperature more than that melting point, the method of reducing the rate of a birefringence of spinning yarn is learned by cooling (for example, JP,39-7251,B, JP,41-

7892,B).

[0005] However, since [that these approaches may be enough for cooling when the spinning yarn obtained is / a single-yarn denier / polyester fiber 10 deniers or more; and since it is not carried out to homogeneity], Although the method of the problem that denier spots are large and ductility is not good arising, and on the other hand making [many] airflow of the cooling style in lengthening blow-off length in order to carry out to homogeneity fully and for cooling is examined, furnishing becomes large-sized and cost also becomes high, and it is intermediary **** disadvantageously industrially.

[0006] As common melt spinning equipment which manufactures a polyester line of thread, there is equipment as shown in drawing 2 . That is, the polymer by which melting was carried out is spun through the mouthpiece 2 in a spinning pack 1, and serves as a line of thread y. Therefore, cooling solidification of the line of thread y is carried out at the cooling gas which blows off from the ventilation section 4.

[0007] If it is going to prepare and manufacture the heating zone 3 in order that a single-yarn denier may make the rate of a birefringence low for non-extended yarn 10 deniers or more with the melt spinning equipment generally used from such the former, denier spots will be large and, originally target high powerful yarn will not be obtained.

[0008] This greatest reason is as follows.

[0009] That is, although it is letting the spun line of thread pass to the heating cylinder more than the melting point in order that a single-yarn denier may obtain non-extended yarn with a rate [of a low birefringence] of 10 deniers or more using usual melt spinning equipment, yarn temperature is high and cannot cool to that the usual cooling airflow is enough and homogeneity.

[0010] Moreover, since it is generally low spinning speed in order to obtain the rate of a low birefringence, yarn temperature cannot fall further easily that a company style cannot occur easily.

[0011] In order to solve this problem, tension is improved and the approach of making [many] cooling airflow brings a result to which not only intermediary ***** with the high rate of a birefringence but a yarn shake increases denier spots violently. Moreover, as for the approach of lengthening spinning chimney length, it is disadvantageous for facility cost to go up, since a facility will become overly ****, and to adopt industrially.

[0012]

[Problem(s) to be Solved by the Invention] This invention cancels the trouble of such a conventional technique, and it takes over, a next single-yarn denier cools efficiently a polyester line of thread 10 deniers or more to homogeneity, and it aims at offering the melt spinning cooling system for [which is a rate of a low birefringence and manufactures the small non-extended yarn of denier spots cheaply simple] having been spun.

[0013]

[Means for Solving the Problem] That is, in the melt-spinning cooling system with which this invention carries out melt spinning cooling of the polyester which makes ethylene terephthalate a main repeating unit, and the single-yarn denier after taking over obtains non-extended yarn 10 deniers or more, it is the melt-spinning cooling system of the polyester fiber characterized by to have prepared the exhaust air suction section in the blow-off section of the 1st cooling style and directly under [of it], and to prepare the blow-off section of the 2nd cooling style directly under this exhaust air suction section further. [which blow off so that a cooling wind may cross to a spinning line of thread]

[0014] Hereafter, this invention is concretely explained based on a drawing. Drawing 1 is the mimetic diagram of the longitudinal section showing the example of this invention.

[0015] In drawing, 11 is a spinneret pack equipped with a spinneret 12, the heating cylinder 13 heated more than the melting point of spinning yarn y is formed in a camber directly under location, and the blow-off section 14 of the 1st cooling style of horizontal **** which blows off in a longitudinal direction is further arranged in the cooling wind caudad.

[0016] Moreover, the blow-off section 15 of the 2nd cooling style caudad of the blow-off section 14 of the 1st cooling style is arranged, and the exhaust air suction section 16 is formed between this blow-off section 15 of the 2nd cooling style, and the blow-off section 14 of the 1st cooling style.

[0017] Thus, in the constituted equipment, the polyester by which melting was carried out is breathed out from a spinneret 12, and spinning is carried out as a line of thread y through the heating cylinder 13 heated by the elevated temperature more than the melting point.

[0018] Therefore, the formed line of thread y is cooled in the style of cooling by the blow-off section 14 of the 1st cooling style of horizontal ****. Subsequently, the air in a cylinder is discharged by the exhaust air suction section 16, since the temperature in a cylinder falls and it is further cooled by the blow-off section 15 of the 2nd cooling style, cooling of the spinning chimney lower part which the rate of a birefringence generates increases, solidification is promoted, and the non-extended yarn of the rate of a low birefringence is obtained.

[0019] As for the exhaust air suction section 16, it is desirable to prepare so that it may exhaust from the blow-off section order of the cooling style here, and it becomes possible to be able to prevent that a line of thread inclines toward an one direction therefore to adjust and attract the amount of suction from both sides, and to control denier spots further to it.

[0020] Moreover, exhaust wind quantity will not be limited especially if it is appropriately selected from the denier of the airflow of the horizontal **** cooling style, a spinning rate, and non-extended yarn in the range with which are satisfied of the effectiveness of this invention.

[0021] Furthermore, what is necessary is just to select the magnitude of exhaust air suction opening appropriately in the range from which local yarn shake increase is not made to start, as a result of making it small and gathering a suction rate to the degree of pole.

[0022] Moreover, the location of the exhaust air suction section has the inclination denier spots' increasing violently becomes that a yarn shake tends to make, when it is desirable to make it the range of **20cm of points completing [**-ized] and this location crosses 20cm of upper parts from the point completing [**-ized]. Conversely, if 20cm of lower parts is exceeded from the point completing [**-ized], since the yarn temperature in the point completing [**-ized] is high, the inclination which it cuts difficultly that uniform cooling becomes difficult and obtains the rate of a low birefringence will arise.

[0023]

[Example] Hereafter, an example explains still more concretely.

[0024] the polyester polymer of intrinsic viscosity 0.9 -- about 300 degrees C -- fusing -- 0.3mm of apertures, and a hole -- a number -- cooling solidification was carried out spraying through and a 25 more-degree C cooling wind on the 400-degree C so-called heating cylinder after the regurgitation from the spinneret which has 48 pieces, oils were given by the oiling roller after that, and it rolled round by part for 800m/as 15 deniers of single-yarn deniers.

[0025] At this time, the cooling wind for 4Nm3/was sprayed from the blow-off section of the 1st cooling style, and the non-extended yarn with which the rate of a birefringence with little

IBUNESU u% to 0.5% of denier spots subsequently has 3Nm of rates of a low birefringence of 0.003 from the exhaust air section 3 / when it part-draws in and sprays by 3Nm3/from the blow-off section of the 1st cooling style was obtained.

[0026] In this case, when it cooled by the spinning chimney of the conventional method, since yarn temperature did not fall, by 0.007, ***** and its spots were increasing and, as for the ductility of the obtained non-extended yarn, 1.0% of denier spots and the rate of a birefringence fell [IBUNESU u%] remarkably.

[0027]

[Effect of the Invention] The remarkable effectiveness of becoming possible to stabilize the high powerful yarn which could stabilize and obtain at the rate of a low birefringence of 10 deniers or more easily [it is difficult and / ***** and a single-yarn denier / yarn / polyester / with few denier spots / non-extended yarn], and was excellent in quality as a result with conventional melt spinning equipment according to [like / explanation] this invention, and to produce above is done so.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the mimetic diagram of the longitudinal section showing the example of this invention.

[Drawing 2] It is the mimetic diagram showing the longitudinal section of conventional equipment.

[Description of Notations]

11 Spinneret Pack

12 Spinneret

13 Heating Cylinder

14 Blow-Off Section of the 1st Cooling Style

15 Blow-Off Section of the 2nd Cooling Style

16 Exhaust Air Suction Section

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